GUIDELINES FOR

PERFORMANCE MEASUREMENT

U.S. DEPARTMENT OF ENERGY
Office of Policy
&
Office of Human Resources and Administration
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Contents

Overview

INTRODUCTION

Federal agencies, states, businesses, and foreign governments are increasingly relying on performance measurement information to help chart progress in increasingly frugal times.

Performance measurement[1] involves determining what to measure, identifying data collection methods, and collecting the data. Evaluation involves assessing progress toward achieving *performance expectations*, usually to explain the causal relationships that exist between *program activities* and *outcomes*. Performance measurement and evaluation are components of performance-based management, the systematic application of information generated by performance plans, measurement, and evaluation to strategic planning and budget formulation.[2]

WHY WE SHOULD MEASURE PERFORMANCE

Performance measurement improves the management and delivery of products and services. A recent opinion poll asked a group of adults what they thought the

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[1] Special terms are highlighted in plain italics text when first used in the document and are defined in Appendix B.

[2] Often the words performance measurement and performance-based management are used interchangeably. So long as we understand each other's language and do not misinterpret expectations, the difference in terminology will not be a problem.

Federal government's top priority should be. Almost half wanted emphasis put on better management. In a world of diminishing resources, improving management of programs and services is critical.

Performance measurement improves communications internally among employees, as well as externally between the organization and its customers and stakeholders. The emphasis on measuring and improving performance (i.e., "results-oriented management") has created a new climate, affecting all government agencies, and most private sector and nonprofit institutions as well. A results-oriented organization requires timely and accurate information on programs and supporting services, whether at Headquarters, Field Elements, or contractor locations. Collecting and processing accurate information depends on the effective communication of mission-critical activities.

Performance measurement helps justify programs and their costs. The public, Congress, and Office of Management and Budget are increasingly taking a more "results-oriented" look at government programs, and the cost-effectiveness of program expenditures is increasingly being called into question. In an era of shrinking Federal budgets, demonstration of good performance and sustainable public *impacts* with positive results help justify programs and their costs.

Performance measurement demonstrates the accountability of Federal stewardship of taxpayer resources. Federal employees and contractors want their day-to-day

activities to contribute to a better society. Performance measurement can show that we are addressing the needs of society by making progress toward national goals.

Performance measurement is mandated by the Government Performance and Results Act (GPRA) of 1993 and is central to other legislation and Administration initiatives. In addition to holding Federal Agencies accountable for achieving program results, GPRA also promotes a focus on service quality and customer satisfaction, and seeks to improve executive and Congressional decision making by clarifying and stating organizational performance expectations, measures, and program costs "up front." The Government Management Reform Act of 1994 gives additional impetus to improve management of government performance by requiring, among other things, annual audited financial statements. Agencies must include performance information (programmatic and financial) in the overview to their financial statements.

HOW WE USE PERFORMANCE MEASUREMENT

Your organization may use performance measurement for three basic purposes:

- Providing measurable results so the Department of Energy (DOE) can demonstrate progress towards goals and objectives. This is done by providing specific measurement results that aggregate to DOE-wide measures.

- Determining the effectiveness of your part of the Department. Your organization needs to determine how well it is meeting its mission, vision, and goals. Developing and using a system of *performance measures* enables you to identify areas needing attention and opportunities for improvement.

- Characterizing the performance of a work process can support improvement of that process. Process improvement teams often analyze work processes by breaking them down into related project activities and tasks to improve quality, timeliness, and efficiency.

This guidance document deals with the first two purposes above. The third, improving work processes, is not covered.

These non-mandatory guidelines are designed to assist DOE's Federal and contractor employees in developing organizational performance measurement systems that tie into Departmental initiatives including the Strategic Management System. It is important to note, however, that performance measurement cannot be undertaken in isolation. It is only one step in a continuous improvement process that includes assessment, strategic planning, program and budget formulation, performance measurement, and *program evaluation*.

WHERE WE ARE

The Department began the process of becoming more "results-oriented," with the Departmental Strategic Plan, the Strategic Alignment Initiative, Performance Agreements with the President, and the Strategic Management System that links strategic planning, budget formulation, program execution, and program evaluation. These initiatives stress the communication of results throughout the DOE complex and with our stakeholders.

There are many other performance measurement initiatives underway in the Department. These are scattered around the complex and are in various stages of implementation. Some Field Elements have well developed organizational performance measurement systems. DOE had six pilot projects under GPRA (Environmental Management, Defense Programs, Energy Efficiency and Renewable Energy, Energy Information Administration, Technology Partnerships and Economic Competitiveness (since canceled), and Morgantown Energy Technology Center). The pilot organizations have a 2-year head start in developing and using organizational performance measures.

The Department's business management oversight pilots have developed measurement methodologies and coordination mechanisms in the areas of institutional business processes, science and technology, and environment, safety and health. *Performance indicators* have been required for environmental, safety and health standards for several years (DOE Order 210.1). Reference 3 is an example of an environmental, safety and health performance indicators report.

Contract reform has been a major initiative in the Department. Management and Operating (M&O) contracts and similar contracts are being revised. The new agreements between contractors and the Department include measures of performance. The University of California, a DOE contractor at three national laboratories, has used performance-based management in its contracting with the laboratories since 1992 (Reference 22).

Finally, the Performance-Based Management Special Interest Group (PBMSIG) of the Training Resources and Data Exchange (TRADE) is a group of contractor and Federal employees with a special interest in performance measurement and performance-based management. Many members of PBMSIG have considerable expertise, particularly in applying performance measurement to process improvement. PBMSIG provides a forum for the exchange of information.

Departmental initiatives have operated with little communication and coordination between (or among) them. This situation had advantages and disadvantages. Organizations and groups felt empowered and began measurements systems without waiting for an overarching system or directions from above. On the up side, they have become leaders in the performance measurement effort, and they are sharing their knowledge and experience with other organizations. On the down side, a result has been the implementation of different approaches, measures, and systems that can (and do) cause undue burden on organizations that fall under the requirements of several systems.

WHERE WE WANT TO GO

The vision is that all organizations within the Department have performance measurement systems to support their own planning and evaluation activities. These measurement systems are part of the Department's Strategic Management System, which addresses appropriate linkages. Through this systems view, duplication of effort will be eliminated by teamwork and collaboration.

To achieve this vision, organizations that do not yet have a performance measurement system are encouraged to develop one to support their own planning and evaluation needs. Coordination of measures among organizations and reducing burden is the

responsibility of every individual in the Department. We must actively work together to develop valid and useful measures and to minimize unnecessary work.

WHAT THIS GUIDE WILL AND WILL NOT DO

This document helps DOE Federal and contractor employees understand, develop, use, and improve performance measurement in a coordinated manner. This is the first DOE complex-wide guidance in this area. The document will contribute to your understanding of what is required by law, how you can meet those statutory requirements, and thereby demonstrate the effectiveness of your organization to Congress and the public.

This document is not prescriptive. It does assign roles and responsibilities nor does it mandate how to do performance measurement in your organization. It does, however, offer suggestions, alternative frameworks, ideas, and references that will help you develop a more results-oriented organization through the use of performance measurement. Performance measurement is only one step toward a future Department of Energy that uses strategic planning, program and budget formulation, budget execution, performance measurement, and program evaluation.

HOW YOU CAN GET THERE

The remainder of this document is organized into six sections, a list of references, and four appendices. Performance measurement needs to occur at all DOE organizational levels. Section 1 describes the linkage between these measurement activities. Figure 1 is a graphic representation of how these

guidelines were structured so that your organization can address varying aspects of performance measurement. This context was chosen as the best way to structure the guidance document for the broadest possible application.

Section 2 describes how performance measurement is, in part, driven by requirements that start at the Secretarial level and by organizations between you and the Secretary. Your organization will need to "look up" to find external requirements that apply to you and to develop methods for reporting the results of your performance.

Figure 1—*Relationships of Document Structure to DOE Organizations*
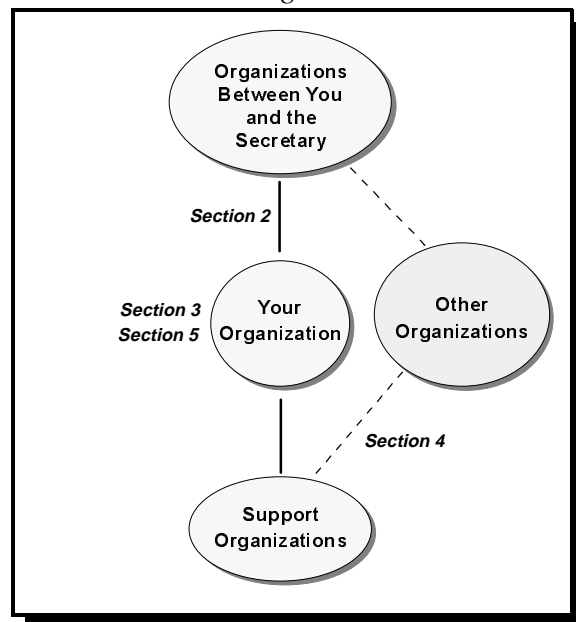
Section 3 gives an overview of how to measure your organization's performance. Several measurement frameworks are discussed. These will help you examine and reflect on your organization's planning and evaluation needs by defining a comprehensive set of performance measures. This section concludes with a step-by-step

process that you can use in designing and implementing performance measurement systems.

During implementation, your performance measures may cascade down and across DOE organizations. Special considerations arise when multiple DOE organizations, including your own, place requirements for performance measurement information on supporting organizations. Section 4 discusses the resolution of coordination challenges.

In analyzing and using the information, recognize that performance measurement has its limitations. Section 5 describes several practical points to bear in mind.

Section 6 concludes with the challenge to everyone in DOE to participate in the performance measurement process.

The References section contains a list of additional resource materials.

Appendix A contains brief descriptions of applicable laws and an Executive Order.

Appendix B contains definitions of performance measurement terms that are used in these guidelines.

Appendix C provides an example of a hypothetical GPRA performance plan for a fictitious DOE organization.

Appendix D lists the DOE Performance Measurement Coordination Team members and commentors who contributed to these guidelines.

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1. Where To Look: Performance Linking

Performance measurement can mean different things depending on where you work in an organization. This guide recognizes these differences by describing performance measurement as seen from the perspective of your organization.

Your performance measures will be used internally by your organization and linked to other DOE organizations (See figure 2). Some of your measures contribute to Departmental measures (dotted and lightning bolt arrows in figure 2). Other performance measures will be used internally by your organization and not reported up to other organizations (curved and solid arrows in figure 2). Performance measurement information comes internally from your organization or your support organizations.

Your measures that contribute to Departmental measures should flow upwards in DOE. These measures support the Secretary and/or organizations between you and the Secretary. These performance measures may be contained in the Department's Strategic Plan, multi-year budget plans, annual budgets, the Annual Performance Plan, Departmental performance commitments, and performance-based contracts. In addition, the organizations between you and the Secretary also have strategic plans, budgets, and commitments that you support.

Aggregate performance measures are often reported to the Secretary and to external stakeholders, and use information across several programs and organizations. Typically, they are crosscut measures to which almost everyone contributes. For example, measuring the worker-to-supervisor ratio for the Department requires information from all DOE organizations. In this case, the information comes from existing Department databases and requires little additional effort on your part. Others, such as customer satisfaction, will require extra effort from most DOE organizations.

Some measures are used exclusively within your organization and do not involve other

Figure 2—*Four Types of Performance Measurement Linking*

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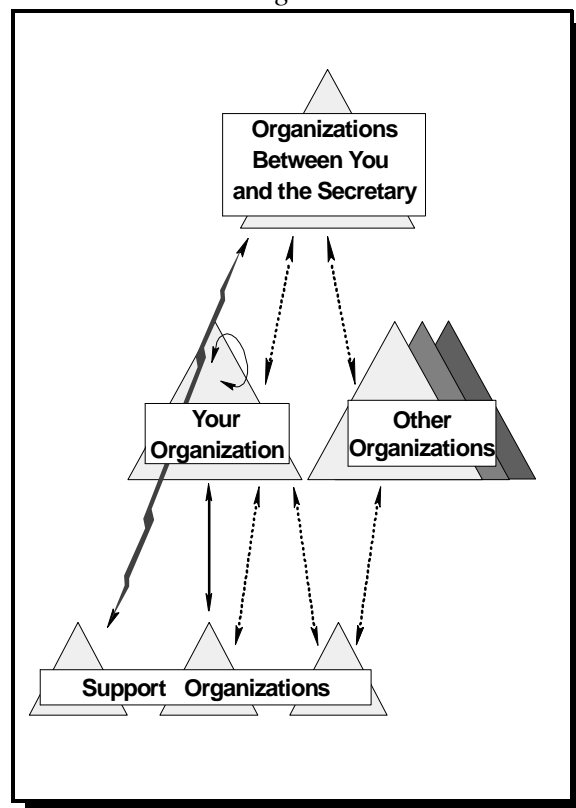
organizations, that is, have no external linking (curved arrow). These measures are entirely defined, designed, and used locally within a DOE organizational level. An example is your staff's report on actual versus planned costs for your projects.

You may also develop and use performance measures that are linked to support organizations (solid and dotted arrows between your organization and support organizations). A contractor's report on actual versus planned costs to a DOE office is an example. These measures, if not coordinated with parallel organizations, may be duplicative or burdensome on your support organizations.

Finally, some performance measures involve only a very small number of organizations, possibly one, reporting information vertically that represents the entire Department. These measures (represented by the lightning bolt in figure 2) are typically counts of products instead of *outcome measures*, but are nonetheless important. For example, the number of nuclear weapons dismantled may constitute a major Secretarial commitment. The commitment may involve only one DOE location. In this situation, your organization may only pass on information contributing to the performance measure.

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2. Looking Up: Tying Into Departmental Systems

> "You got to be careful if you don't know where you're going because you might not get there."
> *Yogi Berra*

The success of DOE's initiative to meet Departmental goals depends on working together to develop useful, specific, and realistic performance measures. Without a real and cooperative effort, performance measurement could become only a paper exercise. But if done well, with every organization and individual contributing, performance measurement can be a valuable self-evaluation and marketing tool.

Performance measurement can identify problems that need fixing and activities that have positive impacts. DOE traditionally produces high-quality work. Quality, however, can always be improved. This is an implicit goal within DOE. Developing and using performance measurement in the Department and aggregating measures for use at higher DOE levels makes improvement possible.

This section discusses how performance measurement provides linkages between the components of the DOE Strategic Management System and performance-based management. The section concludes with advice on where to find information on Departmental performance measures.

STRATEGIC MANAGEMENT SYSTEM

The Strategic Management System defines how the Department expects to manage for results, and comply with the requirements of GPRA, Government Management Reform Act, other laws, and an Executive Order summarized in Appendix A. The Strategic Management System was approved for implementation by the Secretary on March 4, 1996. As noted in the introduction, our vision is that all organizations within the Department implement performance measurement systems to support their own planning and evaluation and that these measurement systems are part of the Department's Strategic Management System. When approved, the Strategic Management System was primarily a road map—a unifying theme for applying performance-based management within the Department. We will need to work together to make the Strategic Management System a reality.

Your performance measurement system is automatically part of DOE's Strategic Management System which is designed to maintain appropriate management and performance information at each level of the organization.

Figure 3—*Performance Measurement in the Strategic Management System*

Planning
DOE Strategic Plan
Secretary's 5-Year Budget
  Guidance
Annual Performance Plan

Budget Formulation
Corporate Budget Review
OMB Budget Submission
Congressional Budget Request

Your Organization

Evaluation
Quarterly Performance
  Reviews
Performance Reports
Employee Performance
  Reviews

Budget Execution
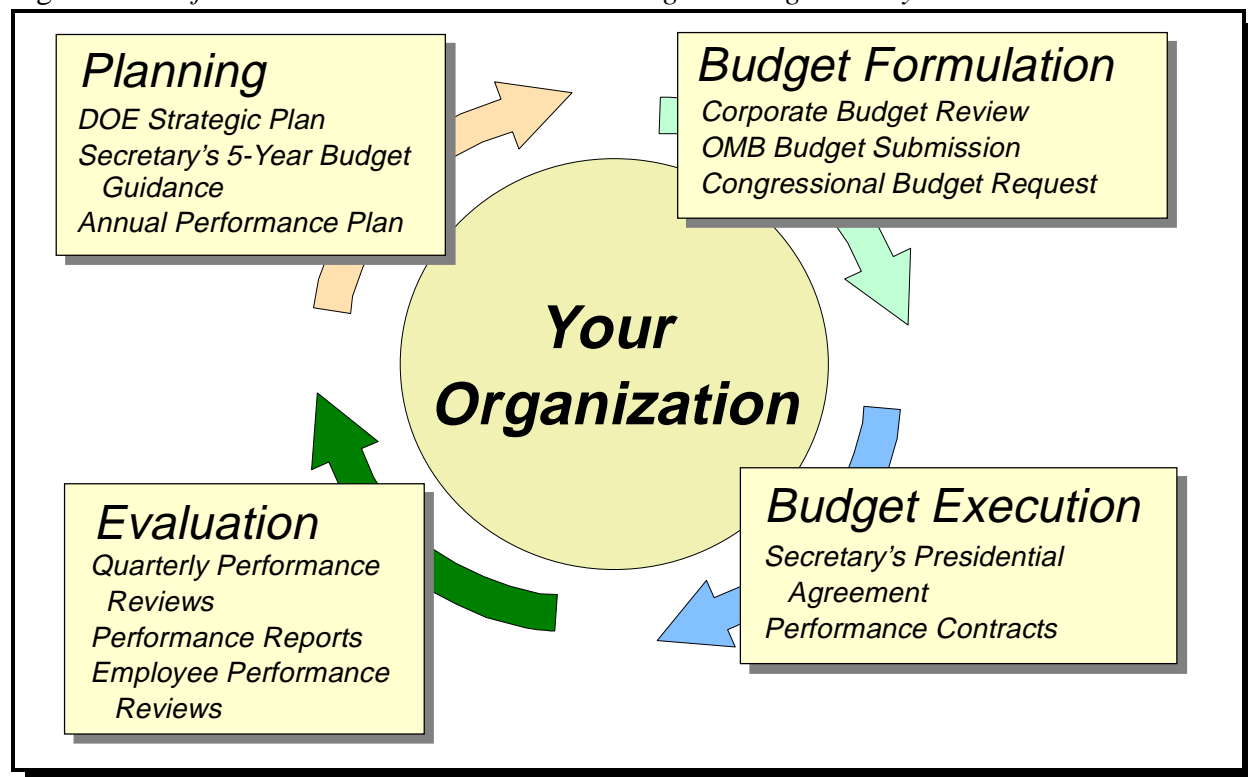*Secretary's Presidential*
  Agreement
Performance Contracts

Figure 3 was derived from Reference 2 to show how your organization's performance measures fit into the Strategic Management System. The Department's Strategic Plan establishes a mission, vision, goals, strategies, and levels of success. The Plan shows where we want to go, identifies strategic goals, and indicates how we are going to get there. It is also the foundation for program, Field Element, and M&O contractor strategic, operational, and institutional plans. Some or all of these plans describe missions, goals, and objectives that may be applicable to you. Strategic planning and performance measurement provide a solid basis for results-oriented resource allocations. Strategic goals, annual *performance objectives*, and measures should also support the Departmental

mission and strategic goals.

Each year, in accordance with the GPRA, the Department prepares an annual performance plan. Based on performance objectives and commitments provided by Secretarial Officers as part of their budget preparation, the plan states the proposed *performance results* the Department expects to deliver for the requested budget. The plan's objectives are closely linked to the goals contained in the Department's Strategic Plan. The annual performance plan accompanies the budget request through OMB and Congressional reviews. Once Congress appropriates funds, the final set of commitments are adjusted to reflect final appropriations. The Secretary establishes the core set of commitments that are measured and tracked during budget execution.

The Department's approach to implementing performance-based management follows its management structure. Headquarters' programs and organizations develop broad performance expectations and related measures to be cascaded throughout the DOE complex. These will be included in the performance plan developed with the budget for the Department. DOE Program and Field Elements carry forward the goals and measures that are contained in the performance plan and add those necessary for their own management proposes. Field Elements work with M&O contractors to develop performance measures relevant to Departmental, Program, and Field Element goals, missions, and operations through performance-based contracts. Whether

performance results are to be used for local management or for aggregation and passed to other DOE organizations, this management structure should be used.

PERFORMANCE-BASED MANAGEMENT

Figure 4 depicts performance-based management displayed with the DOE Strategic Management System. GPRA requires that strategic plans address how measurement and evaluation findings will be used.

Figure *4—Performance-Based Measurement Displayed with the Strategic Management System*
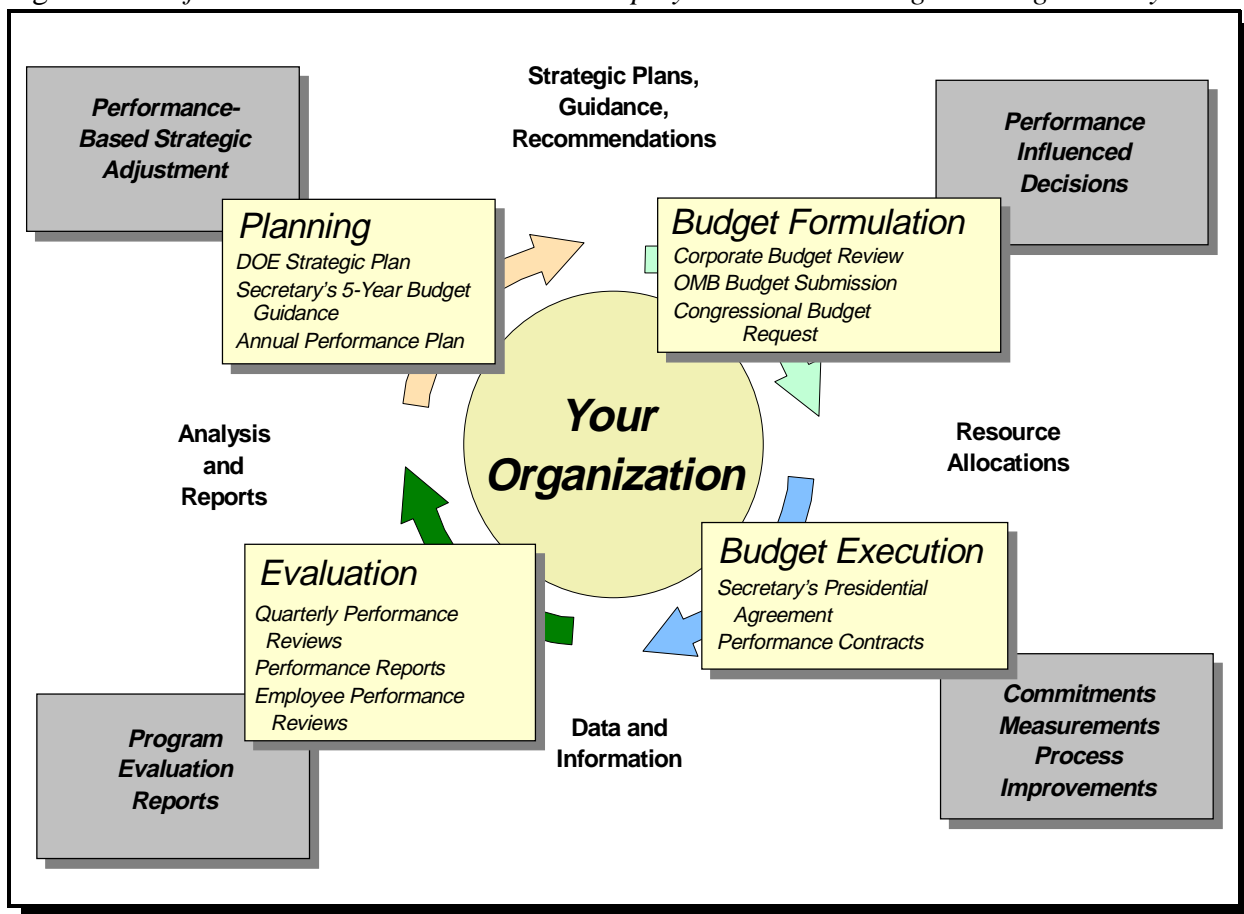
You should use evaluation and performance measurement, during the development of annual performance plans.

During budget formulation, use your organization's performance information to make informed decisions on the allocation of resources. Based upon this allocation, set your annual performance expectations and commitments, develop "appropriate" measures, and start collecting the data.

Your evaluations should include in-depth study and analysis of performance against goals within the context of the program. You should be proactive in ensuring that your performance measures are used during the next planning, budgeting, and execution cycles.

EXISTING DEPARTMENTAL MEASURES

Your organization should check existing Departmental performance commitments and measures for applicability, including the current Performance Agreement or Performance Plan, DOE orders, Environmental, Safety and Health (ES&H) measures, and the Secretary's "Critical Few."

The Performance Agreement between the Secretary and the President or the finalized Performance Plan[3] associated with the

approved budget will contain commitments and measures that may affect your organization. There are program mission-related measures and crosscutting and support-related measures your organization should measure and report. For FY 1995 and FY 1996, these commitments were in the performance agreements between the Secretary and the President.

The Department has established some complex-wide measurement and reporting systems driven by several DOE Orders (including DOE O 210.1, Performance Indicator Program and DOE O 430.1, Life Cycle Asset Management).

In addition, the Secretary has established a set of "Critical Few" performance measures for the Department. These are a small number of crosscutting measures standardized for use and display across the DOE complex. In FY 1996, they are:

- 5-year savings commitment
- DOE employment
- DOE customer satisfaction
- Releases to the environment
- Lost workday case rate
- Diversity

In addition, for each program, the critical few mission-related performance measures will be defined and displayed at appropriate sites.

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[3] It is currently unknown whether we will continue to have Performance Agreements when GPRA goes into effect.

LOOKING UP—HELP MENU*

Did you consider all applicable Departmental, Programmatic, Field Element, and contractor reference materials for performance goals and results that apply to your organization?

Will you need to get any clarification on any of this information?

What performance goals are new? What performance goals are old or no longer required?

How will you provide aggregated performance measurement results to other DOE organizations?

Does more than one DOE organization ask you for the same performance information? Have you raised this issue with those organizations?

> For more help, see Reference 5, Reference 16, Reference 24, and other organizational strategic plans, budgets, and performance commitments.

*   [Editors' Note: Help Menus are provided to facilitate discussions during the development of your performance measures.]

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3. Looking In The Mirror: Measuring Performance

Successful organizations "manage by fact." They do not rely upon anecdotes, rumors, assumptions, or wild guesses to make their business decisions. Performance measurement provides the tools to make fact-based decisions and resource allocations.

This section provides an overview for development and update of organizational performance measurement systems. It reflects a substantial body of literature on this subject including DOE publications. The first part of this section reviews frameworks for developing organizational performance measures. The second part identifies an approach to developing measures for hard-to-measure programs such as research. The third part provides step-by-step advice common to most frameworks. The fourth part provides guidance on assessing how well your organization has implemented and used a performance-based management system.

This section should help you understand the overall performance measurement process and quickly identify references with richer levels of detail. For more detailed information, you may want to examine publications such as the handbook "How to Measure Performance, A DOE Handbook of

Techniques and Tools" (Reference 7). It includes three case studies illustrating the development of performance measures. This document is most relevant to the improvement of process, as opposed to the measurement of organizational effectiveness, but valuable and commonly applicable concepts are provided. It also includes a section on collecting information, constructing indicators, and presenting results. The handbook has an appendix with over 250 sample performance measures.

PART 1: FRAMEWORKS FOR DEVELOPING ORGANIZATIONAL PERFORMANCE MEASURES

When you are developing or updating your performance measures, you should consider conceptual frameworks to stimulate thought about what should be measured. Experience has shown that a framework is needed to organize your thoughts, identify common vocabulary, and ensure appropriate coverage for your performance measurement system. This is particularly important when you are developing a measurement system for the first time. If you are just developing your performance measurement system, select one framework and use it. Although some frameworks fit particular organizations better than others, any framework will help get you started. When updating your performance measures, it is useful to review other frameworks to identify new ideas and approaches that might improve your system.

In DOE, several frameworks have been used. The Energy Information Administration has used the Sink and Tuttle Framework. The Morgantown Energy Technology Center (METC) has developed its own Performance Improvement Measurement Methodology. The Office of Energy Efficiency and Renewable Energy has used the Program Logic Model. The Richland Operations Office and the Pacific Northwest National Laboratory have used the Productivity Measurement and Enhancement System (Reference 20). Other useful frameworks include the Balanced Scorecard and the Family of Measures.

"Sink and Tuttle" Framework

Reference 23 contains a thorough review of the literature as of 1989 and identifies seven criteria for measuring an organization. Their framework is grounded in a supplier-input-process-*output*-customer-outcome model. The seven criteria are:

- Efficiency (inputs)
- Effectiveness (outcomes)
- Productivity (outputs/inputs)
- Profitability/budgetability
- Quality (anywhere in the process model)
- Innovation
- Quality of worklife.

Reference 23 provides a strong focus on linking the measurement of organizational performance to the strategic planning process. The Energy Information Administration (EIA) adopted this framework and used it to develop their performance measures. Reference 13 describes the EIA application, and provides details on the steps taken to use the method.

"Performance Improvement Measurement Methodology" Framework

Reference 15 describes the "Performance Improvement Measurement Methodology" (PIMM), which provides a method of performance measurement that could be broadly applied within a research and development environment. The PIMM is a tool designed to measure organizational performance. It is structured to measure progress against defined near-term and long-term goals, to use customer inputs in setting those goals, and to have an internal quality check. The three facets of measurement used in PIMM are objective achievement, cost performance, and "technology risk" reduction. All product line activities can be covered by the PIMM process, as well as institutional activities that are required to support the programmatic activities, e.g., a significant facility refurbishment.

"Balanced Scorecard" Framework

References 9, 10, and 11 describe the concept of a balanced scorecard that includes four categories of organizational measures:

- Financial
- Customers
- Internal business processes
- Measures of innovation and learning.

This framework is intended for top managers in an organization to be able to obtain a quick and comprehensive assessment of the organization in a single report. Using the balanced scorecard
requires executives to limit the number of measures to a vital few and allows them to track whether improvement in one area is

being achieved at the expense of another

area.

"Family of Measures" Framework

Reference 25 describes five measurement categories:

- Profitability
- Productivity
- External quality (customers, "field performance")
- Internal quality (efficiency, waste)
- "Other" quality (innovations, safety, organizational culture).

Reference 25 emphasizes the "family of measures" concept and the alignment of measures across levels of the organization. Each unit in an organization should have some measures that are unique to it and other measures that are aggregated to a related measure at the next level. This reference also describes how to use a weighting system to aggregate a number of measures into a single, overall measure reflecting how the organization is performing.

"Program Logic Model" Framework

The Program Logic Model (References 1 and 21) is used in a collaborative setting in which program staff, partners, and customers create a model describing the course of action a program takes to achieve its vision and strategic goals. Collaborators establish the major program functions required to reach identified customer needs, and the program resources, activities, outputs, outcomes, and strategic goals associated with each function. The power of the Program Logic Model is that it not only communicates the performance path, "what leads to what," but also communicates the key points at which progress should be assessed to enable program improvements.

There is balance in the measurement process where information is collected regarding resource use, outputs, and intermediate outcomes, as well as the extent to which customer needs are satisfied. In this method, the collaborators have a tool for understanding and communicating how the program will work and the essential performance measures for monitoring program implementation and success. Reference 8 contains DOE examples. The Program Logic Model is also used in the hypothetical performance plan in Appendix C.

PART 2: DEVELOPING PROGRAM PERFORMANCE EVALUATIONS

Program performance measures are a necessary part of all organizational performance measurement systems. Some programs, however, such as research and development, are difficult to measure. Some of the difficulty is due to the subjective nature of assessment, which is the most commonly used method to "measure" performance in these situations. Another difficulty is that some programs have anticipated outcomes that may not occur for many years, possibly decades.

Subjective Assessments

Assessment measurements are basically of three types: qualitative, quantitative, and a combination of the two. Qualitative assessments are usually based on subjective judgements and may use categories that have no natural ordering, e.g., red, white, blue. Pure quantitative assessments can also use categories but have both a natural ordering and a meaning that can be attached to the category differences, for example, the discrete numerical values recorded in ranges such as ages 10–19, 20–29, 30–39, etc. Here the difference is the relative maturity of the members in the age groups.

Assessments of the third type can be subjective and produce data in categories that are naturally ordered, but for which the absolute difference between categories does not have meaning. Subjective assessment methods such as customer satisfaction surveys and peer reviews often produce measurement data of this type. Response categories for a customer survey may be very dissatisfied, dissatisfied, neutral, satisfied, and very satisfied. The order of these categories is clear, but there is no numerical interpretation of the differences between the categories. For this type of data, the distinction between the qualitative and quantitative, and their numerical properties, is unclear and some care must be taken to avoid misapplication and misinterpretation.

However, assessment methods that produce only subjective qualitative data can be valuable if the assessments are at least ordered. In the customer satisfaction example, one measure is the percent satisfied or very satisfied with product quality. Such a measure is most valuable if tracked over time, or compared with customer evaluations of other product attributes at the same time to identify weaknesses.

As another example, if peer review is applied to a group of proposals, the result can be a ranking or ordering of the proposals by the reviewers. If the procedures and definitions used during the peer review process are consistently applied, the statistical descriptions (e.g., percent excellent) may be comparable from panel to panel. There is a wide body of literature in social science research concerning assessment methods.

Future Outcomes

The cause and effect relationship between program outputs and their eventual outcomes is complex. It is not easy to demonstrate that a particular outcome was directly caused by program activities. This is of particular concern for programs, like research, where many of the "end outcomes" (the desired end or ultimate results that are hoped to be achieved by the program activities) cannot be determined for many years. For these programs it may be useful to measure a sequence of "intermediate outcomes" (outcomes that are expected to lead to the ends desired, but are not themselves ends).

These complexities make it difficult to establish quantifiable measures that consistently measure program performance. To address some of these complexities, the Research Roundtable was formed.

Research Roundtable Methodology

This methodology was developed by an interagency Research Roundtable which included DOE and 14 Federal R&D-related agencies. It is the result of a collaborative effort to develop a way to measure output and outcome characteristics of hard-to-measure activities, from analysis to research. It is not yet available in a standard reference.

The Research Roundtable group proposed a method of evaluation which looks at three dimensions of performance: relevance, productivity, and quality. They used the following definitions:

Relevance: the degree to which the program or project adds value and is responsible, timely and pertinent to the needs of customers.

Productivity: the degree to which work yields useful results compared to resources consumed.[4]

Quality: the degree to which work is considered to be technically excellent.

Each of these may be assessed by three possible assessment methods: peer review, numerical assessments, or customer evaluations.

Peer review: The three types are: (1) prospective (addresses the relevance of proposed projects or programs); (2) in-process (examines on-going projects or programs to serve as a quality check); (3) retrospective (addresses the contribution after program/project completion).

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[4] The Research Roundtable did not include "compared to resources consumed." It was added to make this definition conform to standard definitions of productivity.

Numerical assessments: Citations in the literature, number of publications, number of degrees, and other appropriate measures.

Customer evaluations: Opinions of customers about either the extent to which the program or project directly benefits the customer or the extent to which it is perceived to be beneficial to the public.

To illustrate the use of this method, we consider its application to the assessment of analysis products. These are written reports which are first subject to peer review within the organization before they are released to the public. To apply this methodology, a team (possibly including customers and stakeholders) considers the 3 X 3 matrix displaying the dimensions of performance versus assessment method. Considering each element of the matrix one by one, the team would decide how useful that measurement method would be in providing information for the particular dimension of performance.

Table 1 shows that for analysis products both peer review and customer evaluation can be used to evaluate relevance and quality. Customer evaluation was judged most useful in both cases. Numerical assessments can provide little information about relevance and quality of analytical

Table 1—*Example of a Research Roundtable Framework*

Assessment Methods	----- Dimensions of Performance -----		
	Relevance	Productivity	Quality
Peer Review	++	−	+
Numerical Assessments	−	++	−
Customer Evaluation	++	+	++
++ Very Useful + Useful − Less Useful			

products. On the other hand productivity (inputs divided by outputs, or the reciprocal) is best measured by numerical methods. In this case, a productivity measure might be the total cost of the analysis products divided by the total number of products, yielding the average cost per product.

PART 3: STEPS TO DEVELOPING PERFORMANCE MEASURES

The fundamental purposes of performance measurement are to provide insights into operations and to support planning (to make adjustments in organization goals, strategies, and programs that translate into improved products and services to customers and stakeholders). The approach outlined here assumes that your organization already has a strategic plan. Development of performance measures relies upon the description of your organization that comes from strategic planning (Reference 6).

The following steps are not strictly sequential because the development of performance measures is an iterative process. While considering Steps 2 and 3 below, you should consider adapting and using one of the frameworks from Part 1 of this section.

Step 1: Use a Collaborative Process

Develop the measurements using collaborative processes and include both the people whose work will be measured and the people who will implement important parts of the measurement process (if they are different). You may want to have sponsors, internal customers, process owners, and external customers review proposed performance objectives, measures, expectations, and results.

Obtain commitment to your measures and measurement approach from your organization's top management. In order for your measures to be taken seriously, it is extremely important that top managers support your performance measurement process.

Step 2: Describe Your Organization Processes

The frameworks provide the most help in steps 2 and 3. Pick one of the frameworks summarized in the beginning of this section. If you are developing measures for the first time, simply pick the one that makes the most sense to you and start. If you already have a system of measures, it is reasonable to look at other frameworks. They may help you to improve your measures.

Develop a flow process model or input/output chart that defines your organization's main activities.

- What are your main business processes?
- What are the inputs to your organization and their sources?
- What are outputs (e.g., products and services) from your organization?
- Who are your customers (e.g., the users of the products and services)?
- What are the desired outcomes for each business area?
- What are the critical support functions (e.g., resource management) within your organization ?

This work may have been already done during your organization's strategic planning effort.

Step 3: Design the Measurements

When you design performance measures, you should try to:

- Identify information requirements from strategic plans
- Understand the information requirements of organizations between you and the Secretary
- Consider the impact of the measures that you define on organizations that support you
- Select a few balanced measurements
- Avoid "Yes/No" and milestone measures

Design performance measures to demonstrate progress toward achieving the strategic and shorter-term goals laid out in your organization's strategic plan. This will identify your information needs. Make sure you have identified information to measure inputs, outputs, and outcomes for each business area. Identify some long-term, multiyear measures, for purposes of monitoring long-term performance.

Consider your organization's location within the DOE hierarchy, measures needed for reporting upward, and measures defined by parallel organizations particularly those that use the same support organizations. Also consider measures in use by "best in class" organizations. If they fill one of your needs, adopt them.

Carefully consider the resource impact of measurement implementation on support organizations. You should coordinate and establish standard definitions and reporting methods to ensure translation or integration of measures between and across multiple DOE organizations and organizational levels.

Be selective in defining the actual measures to be generated. It is quite easy to measure too much. The process by which performance measurement data will be obtained should be defined at the same time the performance measure is defined. Developing a few particularly relevant measures is a good conceptual goal and is not easy to do. Balance (i.e., measuring multiple facets of your organization) assures that no aspect of the organization will suffer while another part is improved.

Avoid "Yes/No" performance measures, if possible. There is no valid calibration of the level of performance for this type of measure, and it does not motivate improvement. It is difficult to improve upon the "pass" in a pass or fail measure.

Designing measures involves up-front analytical considerations. Quantitative measures are preferred because they yield comparative data about trends which support continuous improvement. In some cases, however, milestone measurement may be all you can come up with. An example is progress on meeting National Environmental

Consider the Message

There is an adage, "what gets measured gets done." An example: the performance measure selected for a military motor pool was the number of cars gassed up and ready to go, as measured by a spot inspection. The unintended outcome was that customers were kept waiting and dissatisfied, as motor pool operators wanted to keep the cars on the lot in case the inspector would arrive.

Policy Act (NEPA) milestones. Milestones

may be acceptable measures when accompanied by an assessment of your organization's ability to meet the performance expectation.

Step 4: Collect the Data

Consider the information required and what data are needed to fill the requirement. Survey what data are available and determine what new data are necessary. You should decide:

- How data should be collected
- How data should be normalized, i.e., how data can be expressed in relative terms such as a rate or percentage to make reporting more meaningful and to allow comparison with results from other sources
- How frequently data should be collected and information reported

If you are collecting data for the first time, include data from the past as well as the present, to the degree possible. This provides your baseline for assessing the current information and demonstrating future improvements. It is difficult to set realistic goals and determine trends before baseline information is available.

Measurements are only useful if the produced values are valid. Ensure data quality because it is crucial to delivering useful information. Data control is a key facet of the data quality problem and involves standardizing data definitions and naming conventions as well as develop useful information. Be sure the individuals whose work is measured buy into your measures. Problems typically arise when the involved personnel view the measures as a threat (e.g., process owners who fear programmatic retribution may bias performance results).

Collection and reporting frequency are dictated by the type of information and its intended use. Collection and reporting frequency do not have to be the same. You may like to see monthly data once a year or you may need to see it monthly.

Balance the data needs against the costs. The demands for data collection should be driven by need considerations, not data collection conveniences. Convenient data may not measure what is needed.

Step 5: Use the Data

There is a difference between collecting data and translating data into useful information. Collected data should be processed and presented in meaningful ways.

- Communicate results internally and externally
- Feed performance results back into strategic planning, budget formulation, and budget justification including performance planning
- Evaluate your programs' performance

Analyze, display, and publicize your performance measures within the organization. Provide sufficient training so that all employees can understand what is being measured and why and, most important, how the organization is performing. Additionally, employees will want to know how they contribute to the measured activities. Use the information to identify needed improvements and set goals for the future. These activities assure that everyone understands the importance of measurement and supports the process.

Use the performance information to report your organization's progress to your external customers and stakeholders. At a Departmental level, DOE uses the data to justify budgets to OMB and reports planned and actual program results to Congress and the President.

Experience has shown that information from performance measurement and evaluation is often underutilized in strategic planning and budget formulation and allocation. There are numerous ways to ensure use, including developing an action plan to respond to measurement and evaluation findings, using collaborative planning, and providing performance information to process improvement teams.

A performance plan describes a logical sequence of activities that demonstrate how a desired result or outcome will be reached. Use a plan to define the key areas of performance to be measured. Your plan should describe what action will be taken based upon possible measurement results and likely performance issues. GPRA performance plans are annual and due with the budget submission to OMB. Final performance expectations are set after budget appropriations are known.

Assess through objective measurement and systematic analysis, the manner and extent to which your programs achieve intended objectives. Performance measurement and performance reviews should be analyzed in the context of external influencing factors, best practice in similar organizations, and in-depth studies such as peer review, surveys and case studies.

Once you have and understand baseline data, compare your performance to best in class organizations, if practical and possible. Determine current performance levels, compare your organization with organizations that embody the qualities that you are striving to achieve, and establish future performance expectations.

Step 6: Continually Improve the Measurement Process

Expect to change your measures and measurement process to respond to changing needs and priorities. Apply the concept of continuous improvement to your measurement system to make sure your measures make sense and measure the right things.

There is an unavoidable tension between "continuous improvement" and continuity in measures and data sets. This should be acknowledged and anticipated, rather than used as an excuse to "lock in" measures permanently, or worse, as an excuse to delay starting measuring performance until the measurement system is perfect. However, care should be taken not to change the measures without careful consideration. Changes may make trend analysis impossible.

PART 4: QUALITY

ASSESSMENT

The overall assessment of an organization's performance includes a determination of how well the organization has implemented a performance-based management system. The Presidential Quality Award for Federal Agencies and the Malcolm Baldridge National Quality Award for the private sector can be used to assess overall organizational performance. The criteria for these two awards are virtually identical and they are embodied in seven categories that include:

- Leadership
- Information and analysis
- Strategic planning
- Human resource development and management
- Measures of process management
- Business results
- Customer focus and satisfaction.

A quality award assessment can be used to determine how well performance measurement is being accomplished within an organization. The criteria are used to evaluate:

- Whether the performance measures are customer generated and focused
- Whether process measures are used to manage processes
- Whether business decisions are made upon the basis of valid data that measure the level of achievement of critical and important organizational objectives.

The quality award assessment process is not proscriptive and therefore does not describe how to develop the proper measures and *metrics*, nor how to implement a performance-based management system. The assessment of an organization against the criteria does, however, provide a method to determine whether the system currently in place has a sound approach, is fully deployed, and is achieving good results.

The first three of the seven categories reflect the extent to which an organization uses effective performance-based management. The last four categories reflect the extent to which the organization has valid measures that are linked to organizational goals and are used to make good business decisions. Regular assessment against the award criteria can be used to continuously improve the leadership of people and the management of processes to satisfy customers now and in the future.

LOOKING IN THE MIRROR—HELP MENU

Do you understand your organization's role or mission that will be measured?

Did you consider your customers and stakeholders?

What performance measurement framework did you select?

Do you have a balanced set of measures so that a comprehensive picture of your organization's performance will be obtained?

Do they measure outputs and outcomes?

Were you selective? Are you measuring too much?

Are performance expectations challenging and realistic?

Have you considered how the data will be collected and used?

Have you identified and compared yourself to best in class organizations?

Will the performance measurement process meet your organization's needs?

For more help, see
Reference 23, pp. 90–94, 163–188, 238-239
Reference 25, pp. 3–42, Reference 7, pp. 2–1 to 2–42

* * *

4. Looking Down And Across: Coordinating Your Measures

The preceding sections described how your organization should tie your measures into those of higher levels of the organization (looking up) and development of a performance measurement system for your own part of the organization (looking in the mirror). Special considerations arise when multiple DOE organizations, including yours, ask support organization(s) for similar performance measurement information.

It is possible that your supporting organizations may be asked for measurement data from another part of the Department. These requests may have come from a parallel organization that is looking across. This can happen within a program area when (1) different organizations independently develop their own sets of measures, (2) between program organizations where a Field Element supports two or more programs, or (3) in crosscut areas where both program organizations and functional areas have overlapping responsibilities. Examples include: Environment Safety and Health (ES&H), contractor overhead, safeguards and security, and project management. However it happens, the result is the same—an organization may be asked to provide multiple, similar measures, increasing the amount and complexity of the workload associated with performance

measurement.

Because of the nature of its organization and recent history, the Department faces difficult challenges in establishing an effective performance-based management system with well understood roles and responsibilities within and among different Departmental elements.

The Department's performance measurement system is intended to both reflect performance and stimulate improvement, without being unduly burdensome. The development of performance measures is an evolutionary process. As strategic plans are updated, and performance measures are added, dropped, or revised, you should expect a lag both in "cascading" and in horizontal conformity. This should be recognized as inevitable—and the sign of a healthy, growing, continuously improving system.

You should help the Department move toward standard definitions for measures by seeking information concerning the measures used by other Departmental elements. Where differences occur and a move toward a more common approach is needed, the recommended approach is the regular application of the following principles.

- Identify challenges
- Partner with all affected parts of the organization
- Focus on desired outcomes
- Improve communications.

IDENTIFY CHALLENGES

You can identify a "looking across" challenge in one of two ways.

- Your organization is asking for measurement data, and another organization is asking the same people for similar data (the challenge is identified by looking down).
- Your organization is providing measurement data, and you observe that a parallel organization is providing similar data (the challenge is identified by looking across).

In either case, a resolution is needed both to minimize the reporting burden and to ensure comparability so that measures can be aggregated.

PARTNER

Once you have identified challenges, you should address them. Identify all affected organizations and contact the appropriate people within those organizations to create a team (partnership) dedicated to meeting the challenge. When analysis points to the need for improvement of a process, all process partners involved need to be included on a process improvement team effort.

The performance measurement literature stresses that performance measures are best developed cooperatively by those responsible for the processes being measured. Partnering simply means that all affected organizations should participate in the team effort.

FOCUS ON DESIRED OUTCOME

Your partnership team needs to understand the performance expectations and objectives involved. With a commitment to partnering, and agreement as to the outcome, consensus building techniques such as brainstorming or the nominal group technique can be used to bring the group to agreement on workable performance measures and metrics.

A key to the partnership effort is that all parties understand the desired outcomes and performance expectations. Unless there is a common understanding, one side may believe that the other is deficient.

CONTINUE COMMUNICATIONS

The key to successful implementation and coordination of performance measurement activities is the sense of teamwork, partnering, and cooperation by all parties. Continue the collaborative process used to develop and implement measures through regular communication year round. This includes joint involvement in all phases: developing measures, monitoring performance on a continuing basis, self-assessment, and evaluation. Focus is then kept on performance, not compliance. Performance-based management is an ongoing activity, not a once a year affair. Continuous interaction forestalls surprises.

Cautionary note: This is not to be used as an excuse to increase oversight activity or to justify more staff. "Staying informed" does not mean additional auditing, validating, or inspecting performance.

LOOKING DOWN AND ACROSS—COORDINATING YOUR MEASURES

Do you coordinate your performance measurement needs with other organizations?

Are key terms in the measurement specification defined clearly and unambiguously?

If information comes from multiple organizations, are the performance results comparable?

Do you need to form a team with affected parties to fix problems?

Does the team agree on what needs to be fixed? Are expectations documented in a charter?

For more help, see Reference 4 and Reference 12

* * *

5. Looking In: What Performance Measures Won't Tell You

This section makes five points. Consider the first when your measurement program is going well. Consider the second and third when your performance program is going poorly. Bear the forth and fifth in mind in either case.

Point 1: **The cause and effect of outcomes are not easily established.**

Outcomes can, and often do, reveal the impact of the program, but without collaborating data, it is difficult to demonstrate that your program was the cause of the outcome(s). The outcomes of public sector services are inevitably affected by many events outside public control. In the weatherization assistance program, for example, it is not always easy to demonstrate energy savings because the changes introduced to homes may result in changes in the behavior of inhabitants that confounds the analysis. Assume, as a second example, that the goal of energy research is to encourage the development of new technologies that will be adopted by industry and result in energy savings. The outcome may not occur for decades, and while it may be possible to claim that the original research contributed to the final product, it will most likely not be the only contributing factor.

To determine the extent to which a program has affected the outcomes and to measure the impact, you need to do an in-depth analysis. Special program evaluations provide estimates of program impacts and help determine why some programs succeed and other do not. The cost of special program evaluations to demonstrate the causes and effects may outweigh the benefits of knowing more about causal relationships.

Though most benefits are expected to be related to your efforts and the original program plan, others may be viewed as serendipitous impacts. Such unplanned outcomes contribute to the value of programs, and should be reflected in performance results appropriately.

Point 2: **Poor results do not necessarily point to poor execution.**

If performance objectives are not being met, it is obvious that something is wrong, but performance information itself does not always provide the reason. Instead, it raises a flag requiring investigation. Possibilities include performance expectations that were unrealistic or changed work priorities. Your organization should be able to explain performance results and to define and address the contributing factors.

Point 3: **Numerical quotas do not fix defective processes.**

There is also a danger when performance objectives become numerical quotas. The setting of numerical goals and quotas does nothing to accomplish improvements in the process. Identify the challenges and changing the processes are what is needed to improve performance and achieve desired outcomes.

Point 4: **Measurements only approximate the actual system.**

Performance measurement provides a valuable tool for management and continuous improvement. However, people might try to "game" the system in a way that will make their programs look good. Additionally, accurate data may not be available. These are among the reasons why you need to recognize the fact that the measured system is not the same as the actual system.

Point 5: **Performance measures do not ensure compliance with laws and regulations.**

Performance measures help form the basis for sound performance-based management.

Performance measures do not however provide information on adherence to laws and regulations or the effectiveness of internal controls. Bypassing internal controls or noncompliance with laws and regulations may expedite operations and thus result in a "favorable performance" statistic which does not necessarily indicate good performance. For example, a building could be constructed more quickly if safety controls and funding limitations were ignored. Because compliance and internal controls often have a direct effect on performance, care should be taken to supplement performance measurement with other oversight activities to ensure that controls are in place and working as intended and that activities are adhering to laws and regulations.

LOOKING IN—HELP MENU

Do you know what your outcomes are? Can you identify your program's impact?

What methods will you use to verify your program's performance results? Are the costs prohibitive?

If performance fell short of expectations, do you know why?

If you continually meet or exceed your performance expectation, do your performance expectations need to be more challenging?

Have you evaluated your measurement system for possible misinterpretations?

When do you plan to reexamine and reassess your performance measurement system?

For more help see
Reference 4, pp. 5–8, Reference 23, pp. 166–170, Reference 25, pp. 3–5

* * *

6. It's Up To Us

Performance measurement affects everyone in DOE. All of us play a role in executing the missions of the Department. You may play a staff support role that leads to the success of related processes within your organization. Or, you may play a critical role in a larger organizational context. All of us must work together to achieve success.

To work effectively, performance measures require clearly understood expectations, objectives, and definitions so that every member of the team is working toward the same end.

Many competing demands for performance information will be made. Program offices will require information from the DOE business lines on R&D, projects, and operations. Crosscut owners who have responsibility for supporting areas such as communication and trust, human resources, ES&H, and management practices may require information with a different focus.

It is up to us to identify a few really substantive measures and develop streamlined processes for their collection and use.

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Appendix A: Legal Requirements for Performance Measurement–A Summary

GOVERNMENT PERFORMANCE AND RESULTS ACT OF 1993 (GPRA)

GPRA requires each Federal Agency to:
- develop strategic plans prior to FY 1998, which include a comprehensive mission statement, a statement of goals and objectives and how the Federal Agency plans to achieve them, a summary of resources required to meet those goals and objectives, and a description of key external factors that could affect achievement of these general goals
- prepare annual plans setting performance goals for the fiscal year beginning with FY 1999
- report annually on actual performance compared to goals; the first report is due in March 2000

GOVERNMENT MANAGEMENT REFORM ACT OF 1994 (GMRA)

GMRA requires each Federal Agency to:
- submit to OMB a single, audited financial statement for the preceding fiscal year, which includes performance measures of outputs and outcomes
- give a clear and concise description of accomplishments, financial results, and conditions
- disclose whether and how the mission of the Federal Agency is being accomplished and what, if anything, needs to be done to improve either program or financial performance

CHIEF FINANCIAL OFFICERS (CFO) ACT OF 1990

The CFO Act requires each Federal Agency to:
- submit to the OMB annual, audited financial statements for each revolving fund, trust fund, office, bureau, and activity which performs a substantial commercial function
- develop and maintain an integrated agency accounting and financial management system including financial control, which ... provides for the ... systematic measurement of performance.

FEDERAL ACQUISITION STREAMLINING ACT OF 1994 (FASA)

FASA requires each Federal Agency to:
- approve or define the cost, performance, and schedule goals for major acquisition programs
- determine the continuing need for programs that are significantly behind schedule, over budget, or not in compliance with performance or capability requirements; and identify suitable actions to be taken, including termination, with respect to such programs
- develop results-oriented acquisition process guidelines for implementation by agencies in acquisitions of property and services

INFORMATION TECHNOLOGY

MANAGEMENT REFORM ACT OF 1996 (ITMRA)

ITMRA requires each Federal Agency to:
  •establish goals for improving the efficiency and effectiveness of Federal Agency operations and, as appropriate, the delivery of services to the public through the effective use of information technology
  •prepare an annual report on the progress of achieving the goals
  •ensure that performance measures are prescribed for information technology used by or to be acquired for, the executive Federal Agency and that the performance measurements characterize how well the information technology supports programs of the executive agency
  •benchmark, where possible, Federal Agency process performance against such processes in terms of cost, speed, productivity, and quality of outputs and outcomes
  •analyze the missions of the executive agency and, based on the analysis, revise the executive Federal Agency's mission-related processes and administrative processes as appropriate before making significant investments in information technology that is to be used in support of the performance of those missions.

SETTING CUSTOMER SERVICE STANDARDS (Executive Order 12862)

Executive Order 12862 requires each Federal Agency to:
  •identify and survey customers
  •post service standards and measure results against those standards
  •benchmark against the best in the business
  •survey front-line employees for improvement barriers and ideas
  •provide customers with choices in both sources of service and means of delivery
  •make information accessible
  •provide a means to address customer complaints.

* * *

Appendix B: Definitions

Performance measurement definitions are provided in three groupings.

1. **DOE performance measurement terms** consist of definitions for the following:
   - Performance objective
   - Performance measure
   - Performance expectation
   - Performance result
   - Performance measurement

2. **Selected measurement terms** consist of definitions for the following:
   - Impact
   - Input
   - Metric
   - Outcome
   - Output

3. **Statutory terms** consist of definitions for the following:
   - Outcome measure
   - Output measure
   - Performance goal
   - Performance indicator
   - Program activity
   - Program evaluation

DOE PERFORMANCE MEASUREMENT DEFINITIONS

The following DOE definitions and accompanying discussions were developed for the Business Management Oversight Pilot in the Fall of 1995. The terms are structurally related as depicted in figure B.1.

Figure B.1—*Structural Relationships Between DOE Performance Measurement Concepts*
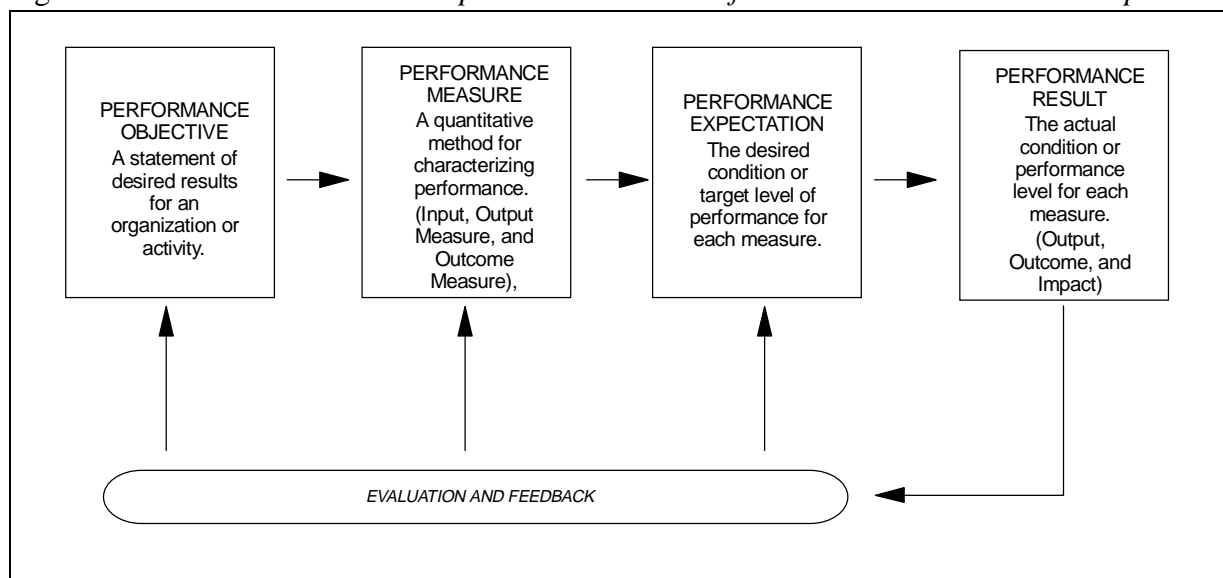
Performance objective: **a statement of desired outcomes for an organization or activity.**

Performance objective is an initial performance measurement concept that describes the desired outcome. To be able to measure performance, one must be able to express the outcome desired from an organization or activity. Using a financial management example, a desired outcome for an accounts payable process would be, "Accounts are paid timely." That statement reflects timeliness as an end result of the accounts payable organization.

The Department Strategic Plan, Performance Plan, and program performance plans serve as the starting points for defining desired results for an organization or activity. These plans serve as guide posts by which DOE Field Elements and contractors establish strategic and operating plans. Identifying and expressing desired results for any contractor organization, therefore, should begin by correlating the outcome of the organization or activity with strategic and operating plans and goals.

Performance objectives may be established at any level within an organization or activity. The concept of describing desired outcomes can be a cascading of objectives from the corporate level down through the organization.

Performance measure: **a quantitative or qualitative characterization of performance.**

Once a desired outcome is identified a method must be established by which actual performance can be described i.e., how performance can be determined. Measures of performance that may be quantitative or qualitative are the most appropriate means.

The method used must describe or characterize actual performance. Quantitative methods for characterizing performance will usually include a counting method and the units to be counted. Though qualitative characterizations may be required, use of quantitative characterizations are preferred.

In the accounts payable performance objective example, the measure used to characterize performance would be: "The percent of payments made by the payment due date, computed as follows: the dollar amount of payments paid by the payment due date, for the period October 1, 1995 through September 30, 1996 divided by the total accounts payable payments made for the same time period." In the example, the measure characterizes performance as a percentage of payments made by a due date. It defines the method by which the percentage will be calculated and the time period for which performance will be measured.

Performance expectation: **the desired condition or target level of performance for each measure.**

The performing organization or activity must have a clear understanding of the performance level expected by their customer(s). Expectation is used to describe the desired level of performance for each performance measure. A performance expectation can be characterized as a target, goal, standard, or other expression of the level of performance required by the customer.

When compared to actual performance derived by the performance measure, an assessment of the acceptability of the organization or activity's performance can be

determined. The performance expectation is used to judge actual performance. Expected performance can be a specific number or level or it can be a range within which performance is to be considered acceptable. In addition, expected performance can be expressed as a scale of performance levels that correspond to descriptive or numerical performance ratings. For example, less than 80 percent of payments paid prior to or on the payment due date might correspond to a descriptive performance rating of unsatisfactory.

A performance level of 80–90 percent might be described with a rating of satisfactory, and a level above 90 percent might be considered excellent.

Performance result: **the actual condition of performance level for each measure.**

The performance result is used to compare to the performance expectation in order to judge how well an organization or activity's performance meets customer expectations. Examples include number of vendor invoices paid in 30 days or less or another performance level measured at 86 percent.

SELECTED MEASUREMENT TERMS

The following terms are different ways of characterizing performance.

Impact: **characterization of the outcome of a program as it relates to strategic objectives.** A way of measuring impacts involves a comparison of actual program outcomes with estimates of the outcomes that would have occurred in the absence of the programs. Examples include passage of DOE-sponsored legislation that was

supported by DOE analyses, profit of U.S. solar companies using DOE-developed technologies compared to those using standard technologies, and fish counts in cleaned streams compared to streams requiring cleanup.

Input: **a resource consumed by an agency's activities;** resources used to produce an output or outcome (time, money, goods, staff, etc.). Examples include FTEs, contract dollars, information, supplies, and machinery.

Metric: **a standard or unit of measure** (such as length, speed, frequency, degree, time, etc.).

Outcome: **the expected, desired, or actual result to which outputs of activities of an agency have an intended effect.** Outcomes are generally non-numeric, qualitative conditions. Examples include informed decision makers, scientific discoveries, and compliance with clean air, land, and water regulations.

A distinction is sometimes made between end outcomes and intermediate outcomes. End outcomes are the desired end or ultimate results that are tied to a Federal Agency's mission. Intermediate outcomes are expected to lead to the ends desired, but are not ends themselves. In many programs a progression or sequence of outcomes usually occurs. For example, the end outcome of the fusion program could be to demonstrate the commercial feasibility of fusion power production in 40 years. An intermediate outcome could be to generate over 12 million watts of fusion power for at least 1 minute in a test reactor next year.

Output: **a product or service produced by a program or process and delivered to**

customers (whether internal or external). Examples include published reports and papers, constructed facilities, pollution discharges, and clean sites.

Performance measurement: **the process of measuring the performance of an organization, a program, a function, or a process.**

STATUTORY TERMS

The following definitions are found in the Government Performance and Results Act.

Outcome measure: **an assessment of the results of a program activity or effort compared to its intended purpose.** Examples include: results of survey of decision makers, counts of scientific discovery awards, and biological diversity counts in streams and land area.

Output measure: **the tabulation, calculation, or recording of activity or effort and can be expressed in a quantitative or qualitative manner.** Examples include counts of published reports and papers, milestones completed on constructed facilities, quantities of pollution discharged, and number of released clean sites.

Performance goal: **a target level of performance expressed as a tangible, measurable objective, against which**

actual achievement shall be compared, including a goal expressed as a quantitative standard, value, or rate. [Editors' note: the term "performance expectation" is used in this document instead of "performance goal."] Examples include 95 percent of construction projects within budget during the fiscal year, wastewater pollution discharges at or below Environmental Protection Agency standards, and 5,000 acres transferred to state governments from DOE.

Performance indicator: **a particular value or characteristic used to measure output or outcome.** [Editors' note: this term is not used in this document. See "performance measure," "metric," and "performance result."]

Program activity: **specific activity or project related as listed in the program and financing schedules of the annual budget of the United States Government.** In the FY 1998 budget, there were approximately 90 program activities for the Department of Energy.

Program evaluation: **an assessment, through objective measurement and systematic analysis, of the manner and extent to which Federal programs achieve intended objectives.**

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Appendix C: Example Of A Performance Plan

The following is a hypothetical example of what is involved in producing a performance plan under the Government Performance and Results Act. The example uses a fictitious Electronuclear Energy Program at the Department of Energy.

Performance Plan For The DOE Electronuclear Program

INTRODUCTION AND BACKGROUND

The Office of Electronuclear Energy (EN) has undertaken an extensive effort to design and develop a performance plan for the Electronuclear Program for fiscal year 19xx. This effort began with an EN strategic plan that provided the mission statement, vision statement, and strategic goals and objectives for this performance plan.

The first step was to establish a planning team with the widest possible representation. The planning team followed the "Steps to Developing Performance Measures" in the DOE *Guidelines for Performance Measurement,* (DOE G 120.1–5).

In developing the performance plan, the team used relevant reference materials from other DOE organizations. The team supplemented this research with meetings with other DOE organizations to identify and clarify strategic planning and performance measurement requirements.

Detailed process diagrams, analysis procedures, and other items such as minutes of stakeholder meetings, are available from EN planning coordinators.

THE DOE ELECTRONUCLEAR PROGRAM

Mission

The mission of the DOE Electronuclear Energy program is to prove the economic viability of the electronuclear power generating technology. This technology shows exceptional promise of becoming an economically and environmentally beneficial technology for the Nation and providing world-wide marketing opportunities for U.S. corporations.

In order to advance scientific knowledge and achieve its full potential, a better understanding of the supporting science, major component engineering, system-level performance, and power plant economics will be attained.

Vision

By 2030 we expect this new technology to have been fully developed and be well into commercial use, replacing fossil and nuclear plants that have reached the end of their design life, as well as supplying new grid capacity where needed. EN technology should be generating power at total costs at least 20 percent (perhaps 50 percent) less

than competitive sources, thus meeting the Nation's needs for abundant, cheap, domestic origin, safe, and environmentally benign power and providing the bridge needed until fusion power becomes a reality on a large scale. This technology should result in substantive reductions in oil imports, carbon dioxide emissions, and radwaste generation. Utilization of EN by developing countries will be a major contribution to the alleviation of hardships of their peoples. DOE's role in this technology for the next decade will be as a prime mover and champion of the technology. In the decade 2010 to 2019, assuming success, the utilities should take a leadership role in commercializing the technology, and DOE should be able to reduce its efforts sharply. By 2020, DOE should be able to phase out all DOE work other than that required to give technical support to the Government's regulatory agencies.

Strategic plan goals and objectives

EN Technology:
- By 2004 the main elements of the basic science of the EN effect will be well understood.
- The technology will be demonstrated on a pilot scale by 2005.
- Key technology elements will be demonstrated by 2012, if earlier success justifies this step.
- The first fully integrated commercial scale plant built by commercial suppliers at a utility site will come on line in 2020.
- Utilization of the technology by the U.S. and by foreign utilities or governments should be improving the quality of life, saving precious fossil fuels for better uses for many people by 2030, and expanding the EN share of new utility power plant orders to 33 percent.

Compliance:
- DOE will actively assist Federal, State, and local regulatory bodies to establish prudent regulations to assure the safety of personnel working in EN facilities and to protect the quality of human health and environment in the surrounding areas.

Environment:
- By 2003 DOE will be viewed nationally as an "environmental champion"—a leader in protecting and improving the environment via the contribution of EN technology (and DOE's management of EN sites).

Safety:
- DOE's EN program will be the leader in safety (as indicated by fully integrated injury and accident statistics) among the "big power" alternative sources: coal, fission, and petroleum.

Public:
- DOE will strive to achieve broad public acceptance for this power source. The goal is to develop an atmosphere of trust between DOE and the public regarding the EN program through a campaign of information and participation that highlights DOE's mission of safety and efficiently serving the public interest.

Facilities:
- As required, DOE will provide and maintain a facility asset base of appropriate scale and scope at those National Labs and contracted facilities involved in the EN program which will permit them to support and solve problems arising in the use of EN technology. This will terminate in 2030 or before if it becomes apparent that EN will not become a practical energy

source.

Quality & Excellence:
- The EN Program will press for, stimulate, and reward improvements in EN technology, applications, and use, which will reduce the unit costs of power, $/MWday.
- A special objective for the near term is to reduce projected unit costs, $/MWday (as currently projected by independent EPRI studies), by 10–20 percent below 1998 projections by the year 2010 (based on year 1998 dollars).

Financial Stewardship:
- EN will strive for effective and efficient execution of financial stewardship responsibilities to help ensure optimum use of tax dollars and protection of the Department's assets against fraud, waste, and abuse.

Human Resources:
- Develop specific competencies of DOE and key private sector personnel working in the EN area so that the merits of EN technology are valued properly.
- Increase the quality of the EN Program staff throughout the complex, and strengthen their knowledge of new technology implementation barriers

Stakeholders:
- Satisfy the wants, needs, and desires of key stakeholders

THE COLLABORATIVE PROCESS

The first step was to form a Performance Measurement Team that included managers, staff, and research contractors from throughout the DOE organization with a wide range of industrial experience and knowledge of electronuclear technology.

Their work was reviewed and improved by a collaborative team representing customers, partners (e.g., major equipment suppliers), and other stakeholders. The collaborative team was invited to participate in quarterly meetings of the Performance Measurement Team. These two groups worked together to develop, implement and refine a performance measurement system for EN.

OUR ORGANIZATION

For the next step (Define the Organization), the Team used the EN Strategic Plan and other relevant DOE performance measurement resources. The team defined specific outcomes and performance goals consistent with EN technology development plans, appropriate decision points, and the needs of public and private sector decision makers. Outcomes and performance goals were were the basis for performance measures. Performance measurement information will be used to evaluate annual accomplishments and gauge progress toward long-term strategic objectives.

This section addresses key provisions for performance plans found in the GPRA, Article 1115, regarding operational processes, skills, tasks, and performance measures for the Program activity defined in the budget. Table 1 includes the various types of measures—up, down, and across the organization—needed for comprehensive performance management.

EN's Mission, Vision, and Objectives are taken from the Strategic Plan. Several objectives were modified, and others added to conform with the responsibilities and updated requirements assigned to specific organizations involved. This establishes obvious links with the strategic plan and provides very basic guidance to begin

The team developed a simplified flow diagram shown in figure C.1. This diagram depicts the major activities, or high-level processes, that our organization will use to develop EN technology.

The Electronuclear Program Processes begin with *Collaboration*, the interactive planning process that is a collaborative effort with key Program stakeholders. Using guidance from this collaboration, combined with other inputs such as laws and funding levels, the program *Planning, Development,* *and Direction* process generates planning documents (such as the Strategic Plan and this performance plan) and guidance for Program Management.

Program Management integrates the goals, budget allocations, and other planning inputs of the Program. This process yields performance-based agreements with the operating entities that reflect the Program priorities and budget allocations. The products of these activities include cooperative agreements, contracts, work

Figure C.1—*Electronuclear Program Processes*
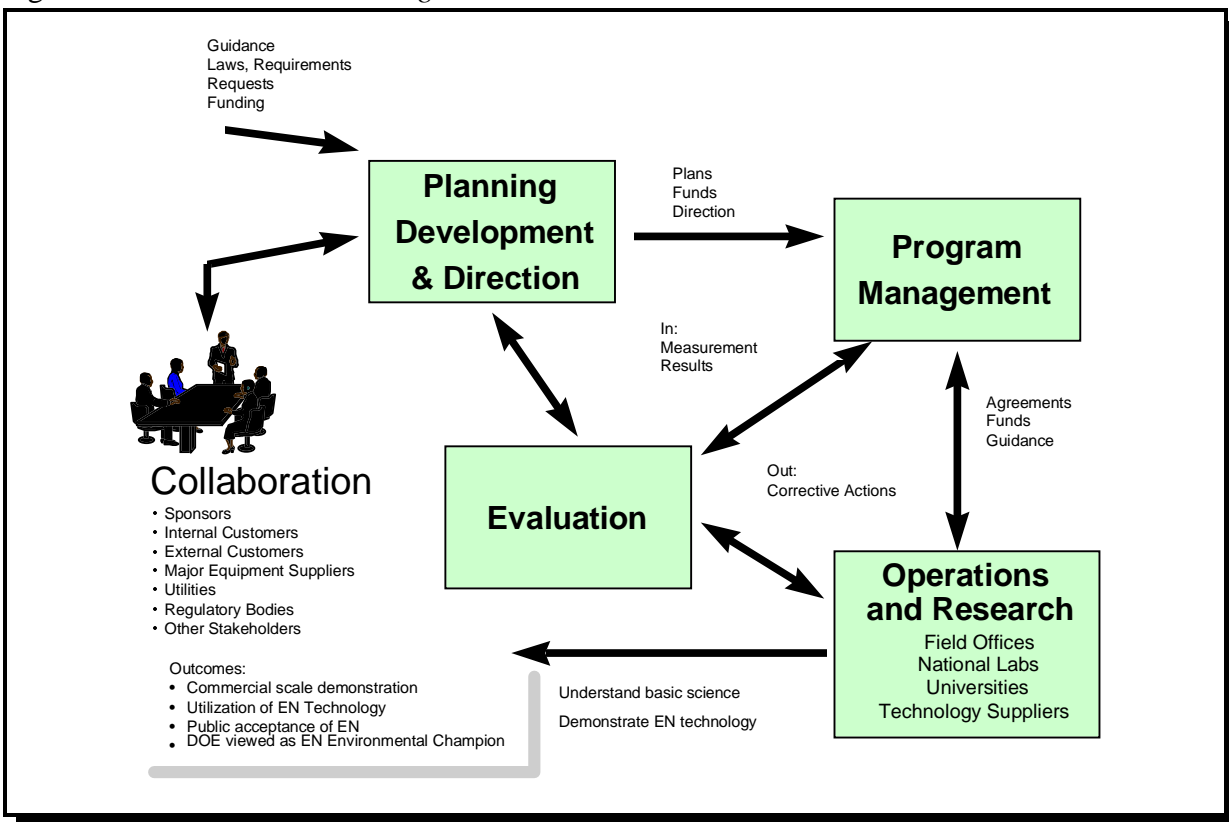
authorizations, and so on. They are driven by the budgets, goals, objectives, and performance expectations. The double-headed arrow indicates the interactive and collaborative nature of this management process.

The *Operations and Research* process is actually a complex set of many processes and projects conducted by the private sector, National Laboratories, universities, potential technology suppliers, and others who will perform the needed technology research and development. Each entity conducts its work according to the performance agreements that, as noted, are driven by the Program budget, goals, and objectives. (Some preexisting contracts are not performance-based; therefore, one of the performance goals is to establish all contracts according to the Contract Reform Initiative). The aggregation of this complex process is expected to yield "bottom line" results as indicated: the demonstration of EN technology. Of course, these are long-term expectations. The performance expectations and measures in this year's plan, while focused on nearer term results are linked to, and in support of, these long term expectations.

The *Evaluation* process includes gathering and assessing performance data, and quality functions. A significant component of the quality function is to judge the effectiveness of the measurement process and the relevance of the evaluations to long-term objectives. Performance data will be gathered from existing databases wherever possible; for example, the Department's existing database will be relied on for health and safety statistics, and the Department of Labor's database will be used to determine

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A Natural Link With Performance-Based Contracts

The planning process described here can dovetail with efforts to establish performance-based contracts by Field Element. According to the requirements of Contract Reform Implementation, DOE Operations Office personnel (or in the case of research contracts, Program Office personnel) work with contractors to develop performance-based Work Authorizations. These must contain lower-level performance objectives, performance measures and performance expectations. Thus, including Operations and Contractors on *Our Organization's* Performance Management Team should improve efficiency and effectiveness in the performance management effort throughout the Department.

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benchmark data. A local database will be used for any other data required. Based on this analysis, the Performance Measurement Team chose the Program Logic Model as the most appropriate framework for developing EN performance measures.

PERFORMANCE MEASURES

Figure C.1 indicates important inputs and outputs for each of the major processes. The Performance Measurement and Logic Flow Chart in figure C.2 was created by the Team to provide a model for displaying the major program activities as well as their outputs and outcomes in relation to the strategic goal. These help to identify the essential items that need to be measured in order to manage performance of the Program. To complete the list, the Team examined Department and Program budget documents, reviewed the Department's Strategic Plan, reexamined the Program Strategic Plan, and

Figure C.2—*Performance-Based Management and Program Logic Flow*
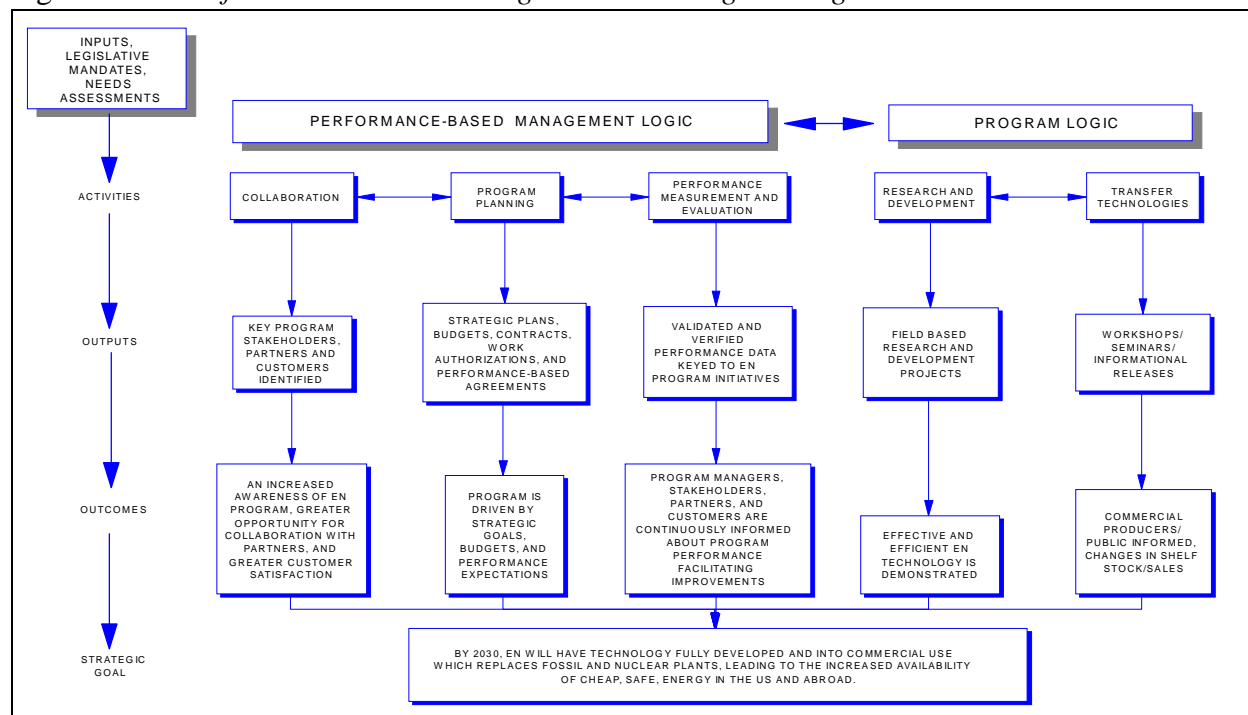
reviewed plans from partners and support organizations. To generate the performance measures list (Step 3), the Team deliberated specific outcomes, products, and other results desired. This yielded a general priority of performances, consistent with the desired results and the established budgets.

Based on that listing, the Team generated the performance goals, levels, and measures. An example of what these might look like for a specific year is summarized in table C.1.

DATA COLLECTION

Actual performance data will be collected monthly and reported quarterly. In some cases, notably health and safety data, baseline data exists. This existing data will be very useful because it will enable us to establish references and assess trends sooner. Most of the data required is readily available. However, new procedures and databases must be established for data related to the

superconductivity experiments. The same is true for several efforts that require survey data to be collected. The total cost is estimated at $26,000. Funding for these important new capabilities will have to be taken from the operational budgets unless supplementary funding can be found.

USING THE DATA

The performance measures should:

- Reflect the results of our efforts
- Enable continuous improvement of our programs processes
- Help us move this important program to a successful conclusion
- Provide us with critical information to foster our accountability.

This can only happen if management receives timely, complete, and accurate reports. Thus, it is essential to analyze and interpret all performance data quickly and accurately.

Routine data analysis procedures have been established to allow "quick look" reports to be generated and loaded on the existing computer network. These reports overlay targets on the actual data so that managers will have up-to-date trending charts, data tables, and analytical comparisons. This approach of continuously visible results helps ensure that, performance stays on track and that it facilitates continuous improvement.

In order to assure data quality and relevance, the Performance Measurement Team will conduct formal reviews each quarter. They will assess the usefulness and validity of the measures, and propose changes to management as warranted. In addition, the team has requested that the performance data be examined by the external auditors as part of their periodic visits.

CONTINUOUS IMPROVEMENT

It is expected that, as part of their periodic reviews, the Team will identify specific opportunities for improvements. Follow-up actions will be taken consistent with the estimated return on investment. For example, benchmarking against best in class will be conducted if the potential yield from improvement is 20 percent or higher. In general, however, the Team will strive for consistency in data collection unless and until process changes require concomitant changes in the measurements.